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August 24, 2018

Via ECFS

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: CommScope, Inc. Notice of *Ex Parte* Meeting
GN Docket No. 17-183

Dear Ms. Dortch,

On August 22, 2018, Christopher Hardy, Vice President – Integrated Solutions, Analytics, Mark Gibson, Sr. Director, Business Development & Telecom Regulatory, and Joe Marzin, Technical Director, of CommScope, Inc. ("CommScope"), as well as Catherine Wang and Denise Wood from Morgan Lewis & Bockius, outside counsel to CommScope, met with the Commission staff identified on Attachment A hereto in connection with developing a spectrum sharing approach in the 6 GHz band that will ensure protection of incumbent microwave systems and allow the introduction of new unlicensed devices.

During this meeting, CommScope underscored that uncontrolled Radio Local Area Network ("RLAN") sharing with primary incumbent microwave users is not feasible. Controlled access through the use of a database-enabled coordination system may be feasible, but more study is needed. Nonetheless, it is essential that the 6 GHz sharing approach require RLANs – not microwave licensees – be responsible for interference protection. It is difficult and expensive for microwave licensees to identify sources of interference, which often requires coordinated system shutdowns.

We discussed CommScope's proposal that all RLANs be required to use a coordination system for RLAN use of co- and adjacent frequencies to microwave receivers. Microwave operators also require that sharing be based on a conservative predictive method with microwave exclusions or protection zones based on actual receiver configurations. CommScope explained that indoor low power RLAN interference into microwave receivers is possible in many

configurations and discussed one example in the New York City corridor.

More study is needed to develop an acceptable sharing approach but in any event it will be critically important to ensure that coordination is based on accurate database information and that sharing not inhibit the full and free deployment of microwave systems. In that regard, CommScope shared with Commission staff data illustrating the extensive and dynamic nature of microwave operations in the 6 GHz band and discussed important use cases of microwave systems. Given the large number and dynamic nature of microwave licensee FCC filings, any sharing approach should require at least daily RLAN interactions with the coordination database to reflect the most up-to-date information.

Finally, CommScope suggested that mutual collaboration through a multi-stakeholder process, possibly through the Wireless Innovation Forum, would be valuable for further study and development of the appropriate sharing methodology in the 6 GHz band.

CommScope suggested that the Commission consider these issues in its upcoming Notice of Proposed Rulemaking in this docket and presented the attached slide deck.

Please address any questions regarding this notice to the undersigned.

Very truly yours,

/s/

Catherine Wang
Denise Wood

Counsel for CommScope, Inc.

Attachments

cc: to the FCC staff listed in Attachment A

Attachment A

Jose Albuquerque
Karen Rackley
Hugh Van Tuyl
Jamison Prime
Thomas Derenge
Syed Hasan
Paul Murray
Paul Powell
Julius Knapp
Ira Keltz
Blaise Scinto
Stephen Buenzow

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Exploration of Sharing at 6 GHz

August 22, 2018

Topics

6 GHz Incumbency and Activity

Basic Sharing Principles

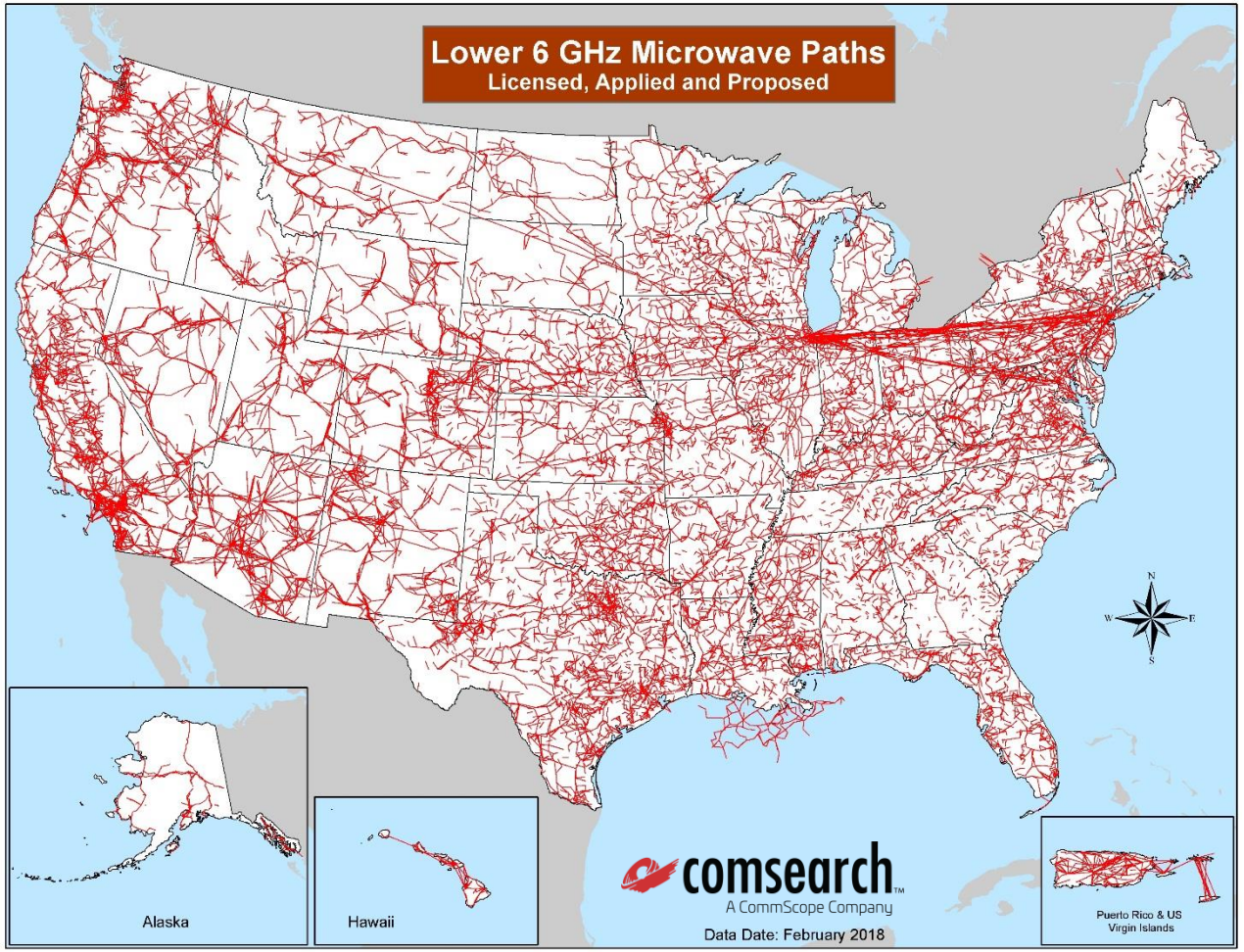
Exclusion Zone Determination

Sharing Methodology

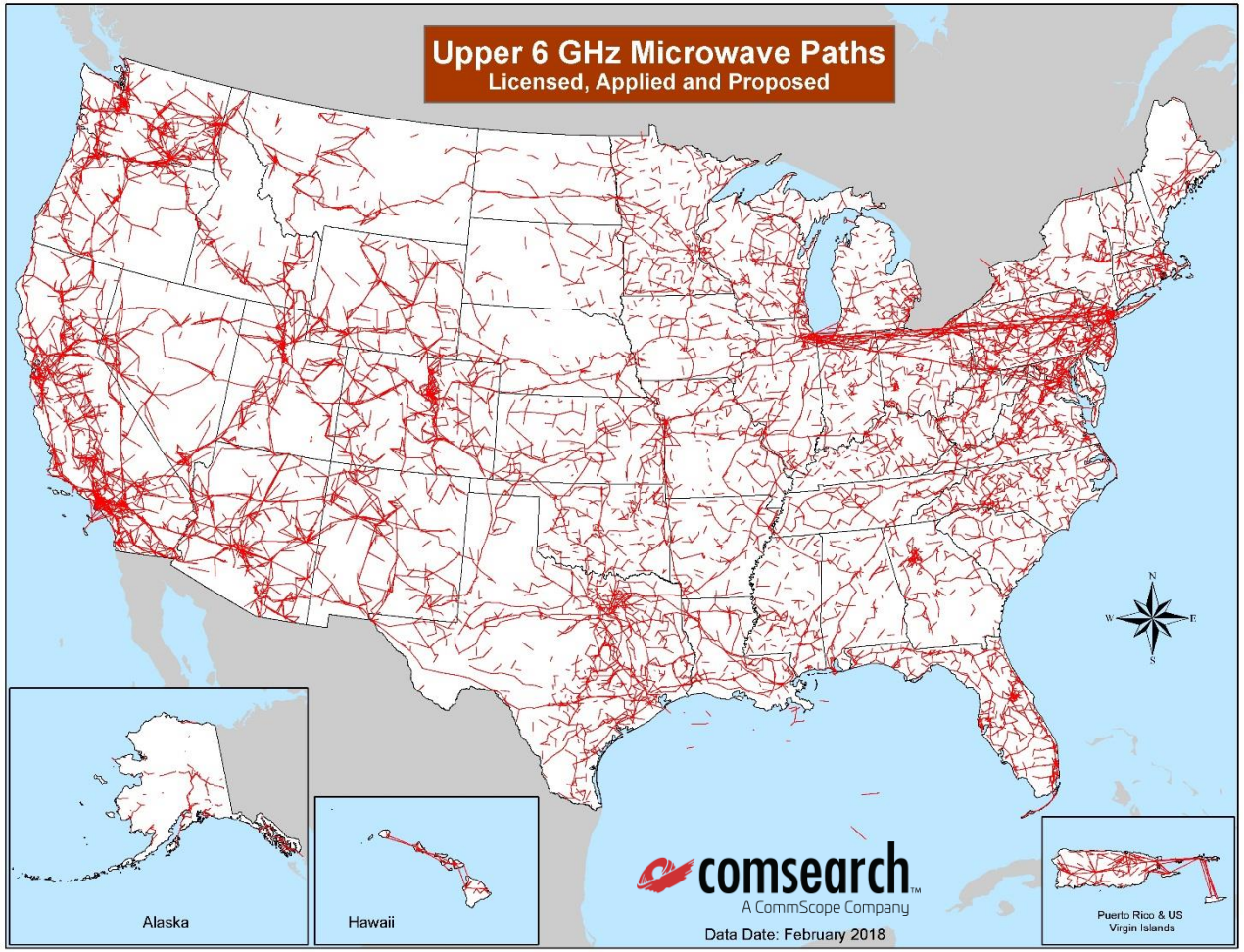
Indoor RLAN Interference into Microwave

Interference Detection and Reporting

6 GHz Activity: Microwave Systems

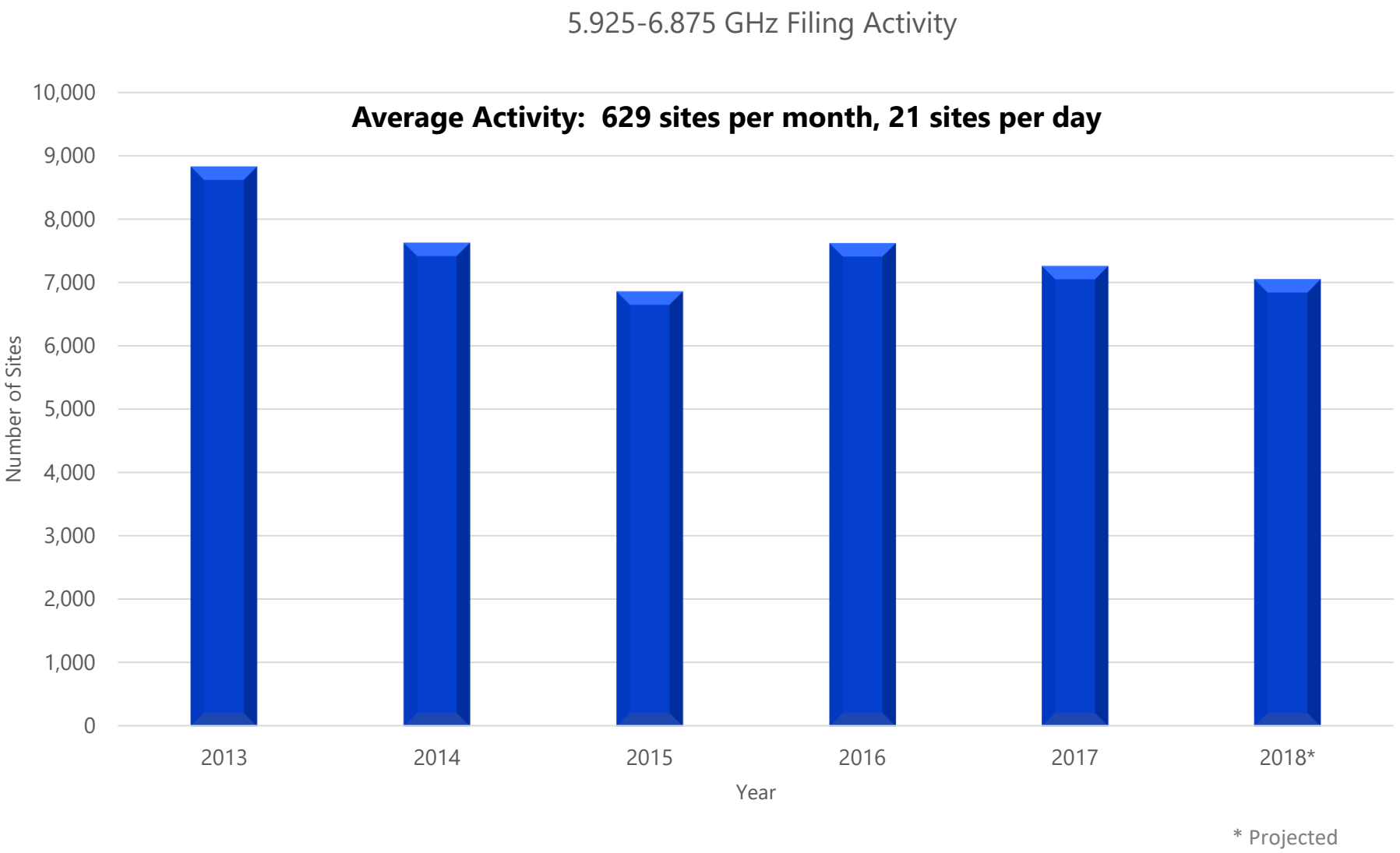


Paths	Transmit Frequencies
24,195	64,833

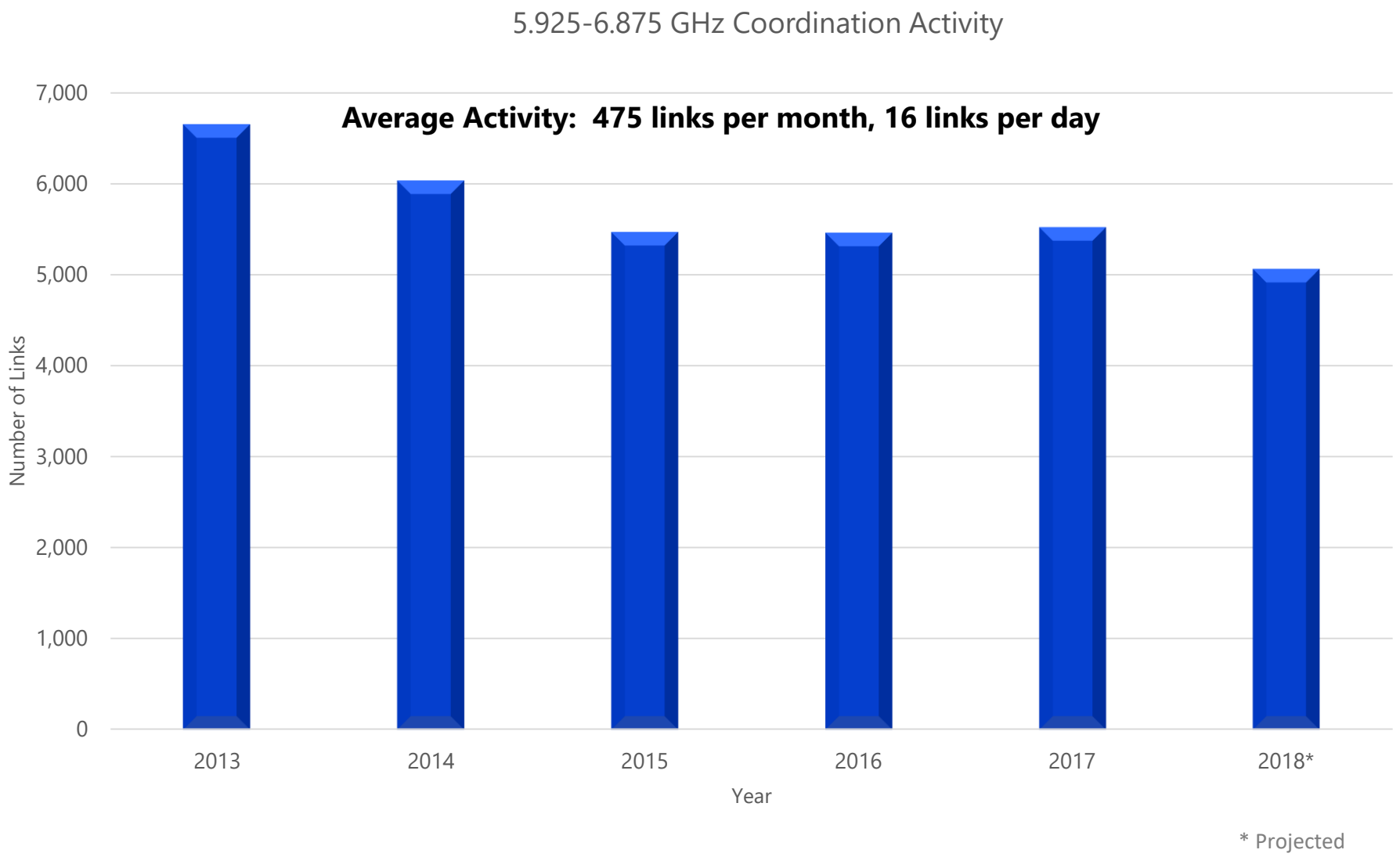


Paths	Transmit Frequencies
14,809	30,973

6 GHz Activity: Application Filing



6 GHz Activity: Coordination



Basic Sharing Principles

Uncontrolled RLAN sharing not possible with primary incumbent microwave users.

All RLANs must use coordination system.

Protection of microwave incumbents must be based on accurate database information.

The coordination system must control transmission by RLANs that are co- or adjacent frequency to a microwave receiver.

Conservative predictive method needed to foster microwave community confidence in protection.

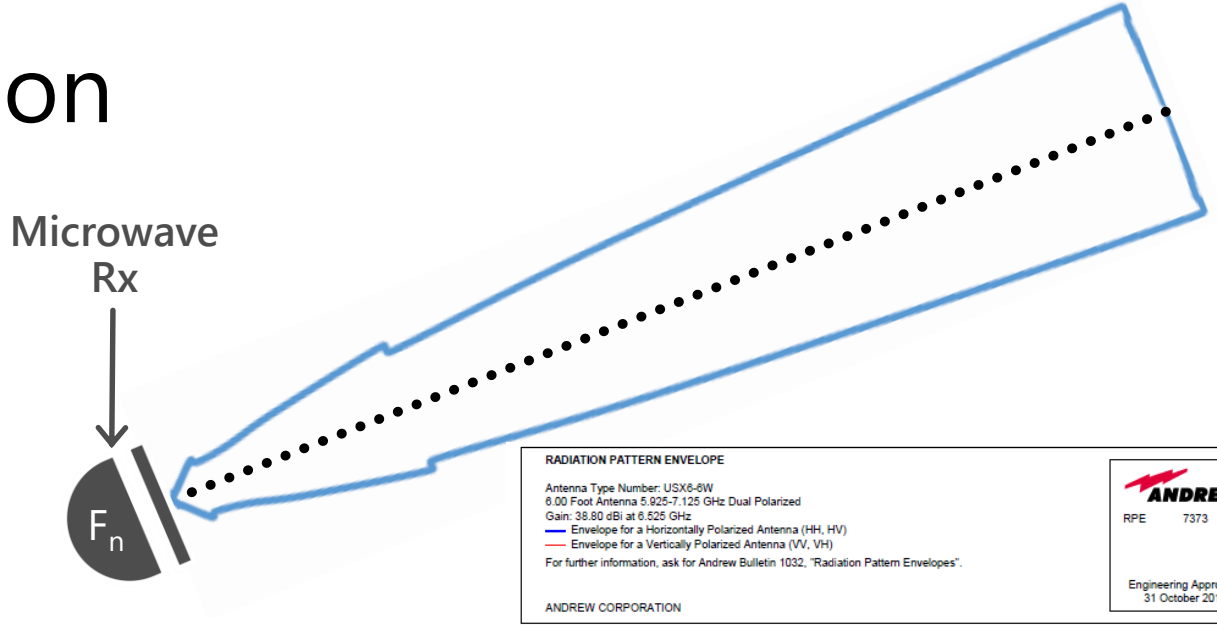
Must avoid placing burden on microwave licensees to monitor for interference.

Multi-stakeholder groups such as the Wireless Innovation Forum should be considered for development of appropriate sharing methodology.

Exclusion Zone Determination

Exclusion zones must be properly determined based on:

- Actual antenna patterns
- Appropriate interference protection criteria
  - Threshold degradation (I/N = -6 dB)
- Appropriate (conservative) propagation models
  - Worst-case RLAN elevation
  - No clutter
- Aggregate interference effects from multiple devices
- Adjacent channel considerations
- Use TIA TSB10-F / STND 10 as guidance



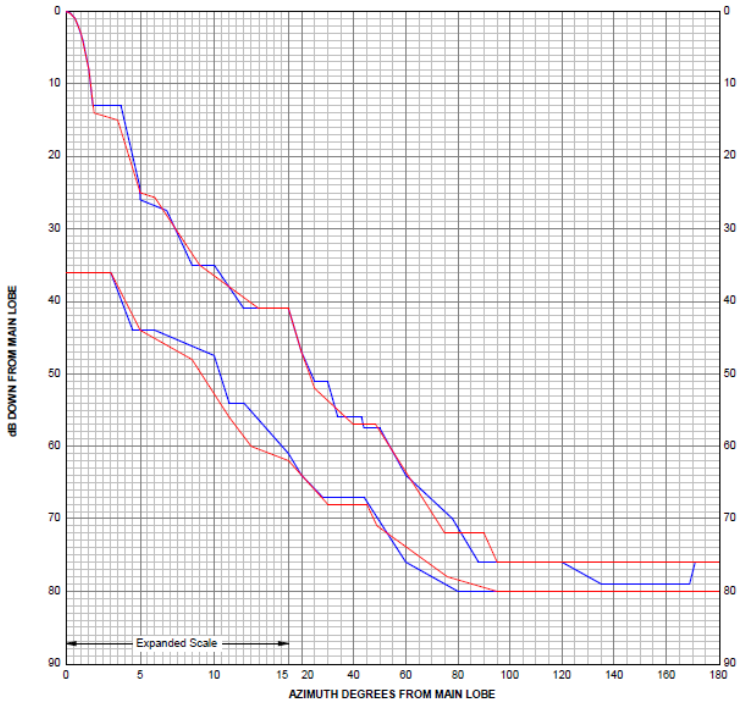
RADIATION PATTERN ENVELOPE

Antenna Type Number: USX6-6W
6.00 Foot Antenna 5.925-7.125 GHz Dual Polarized
Gain: 38.80 dBi at 6.525 GHz
Envelope for a Horizontally Polarized Antenna (HH, HV)
Envelope for a Vertically Polarized Antenna (VV, VH)
For further information, ask for Andrew Bulletin 1032, "Radiation Pattern Envelopes".

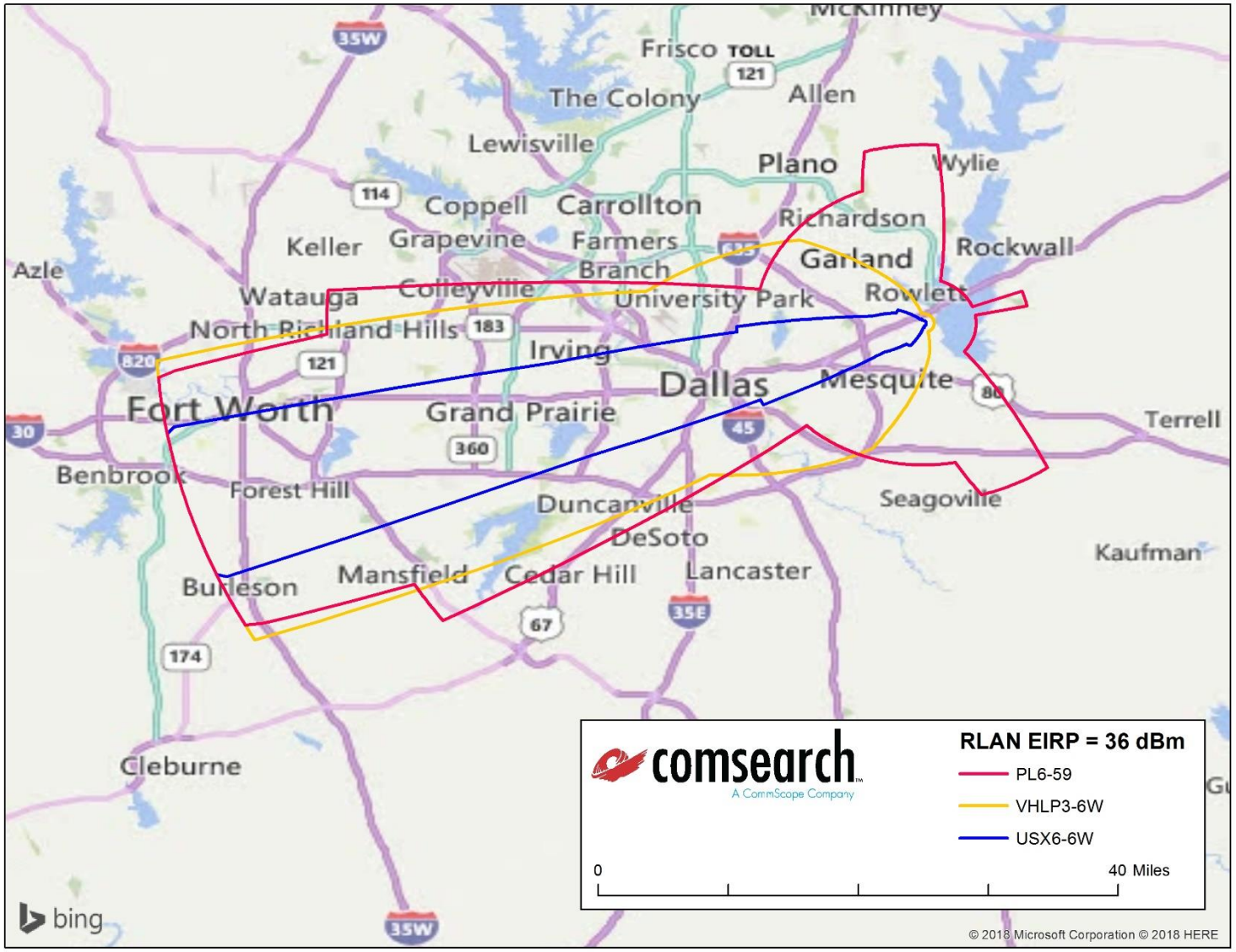
ANDREW CORPORATION

ANDREW
RPE 7373

Engineering Approved:
31 October 2017



Exclusion Zone: Dependence on RLAN EIRP and Microwave Antenna



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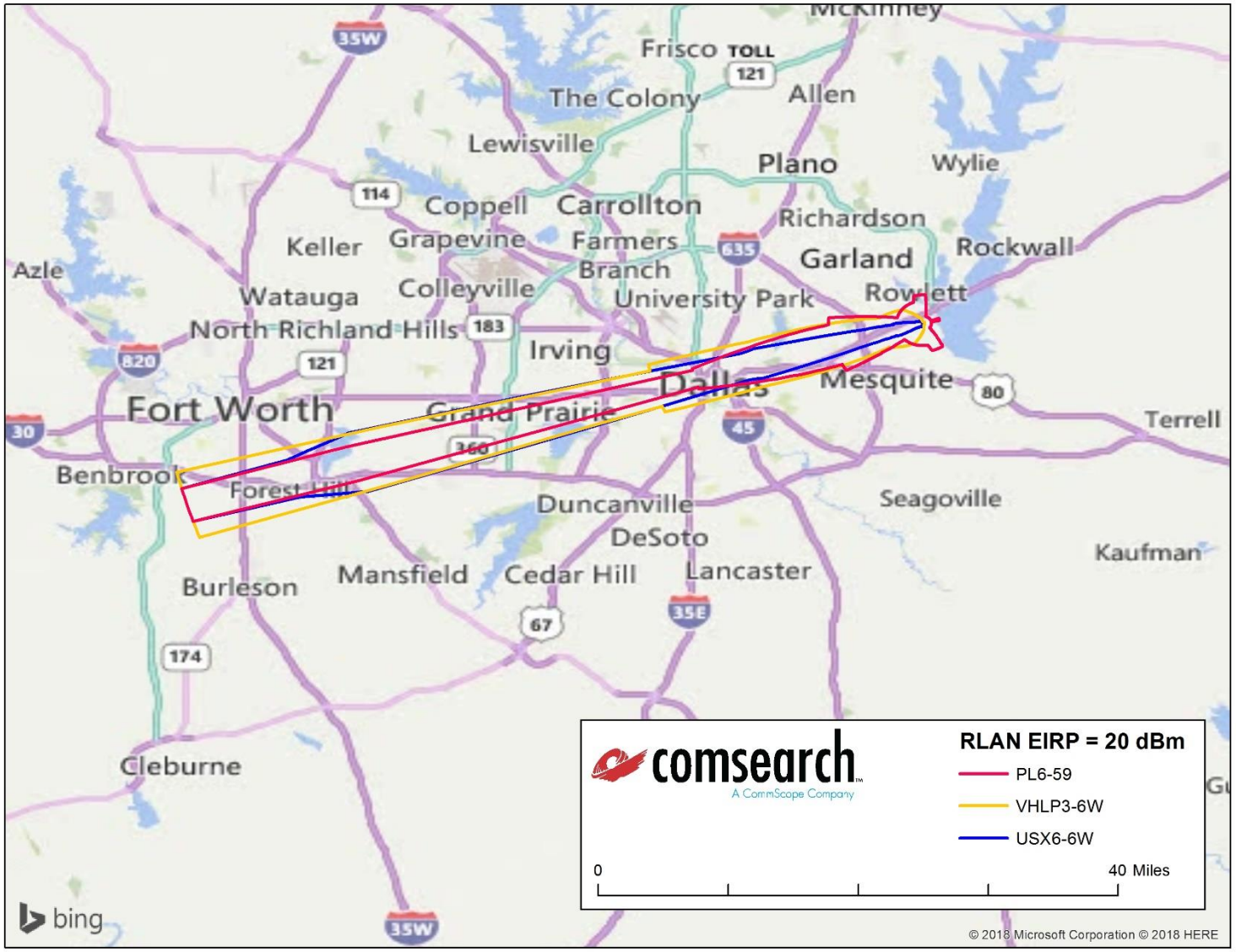


Sharing Methodology

Database contains pre-calculated exclusion zone data for every microwave path

- Exclusion data should be updated at least daily if not more frequently

Every RLAN device registers with database

- Initial registration and query are made outside the 6 GHz bands
- Must allow for cases where the master may be safely outside all exclusion zones but the client is within an exclusion zone

RLAN device queries database with:

- Location
- Device type
- Identifying information

Database determines proximity of device to exclusion zone(s)

- Spectrum availability determination must consider device location inaccuracies

Database returns list of available frequencies to RLAN device

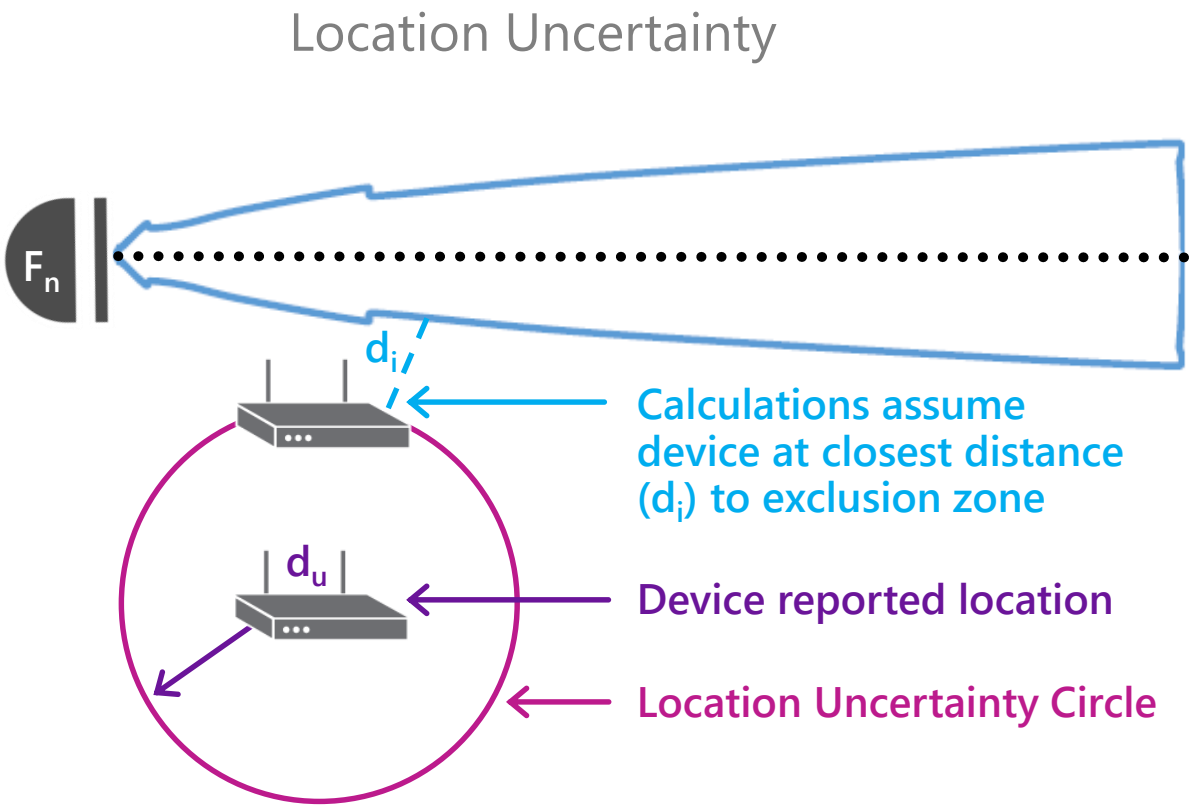
RLAN devices returns to database frequency(ies) selected to operate

RLAN sends heartbeat message to ensure data is current and that device is active

RLAN deregisters if:

- Moves more than 50m
- Fails to heartbeat in 24 hours

No Airborne RLAN operation



Indoor RLAN Interference into Microwave

Low-power (≤ 30 dBm) RLAN interference into microwave receivers is possible.

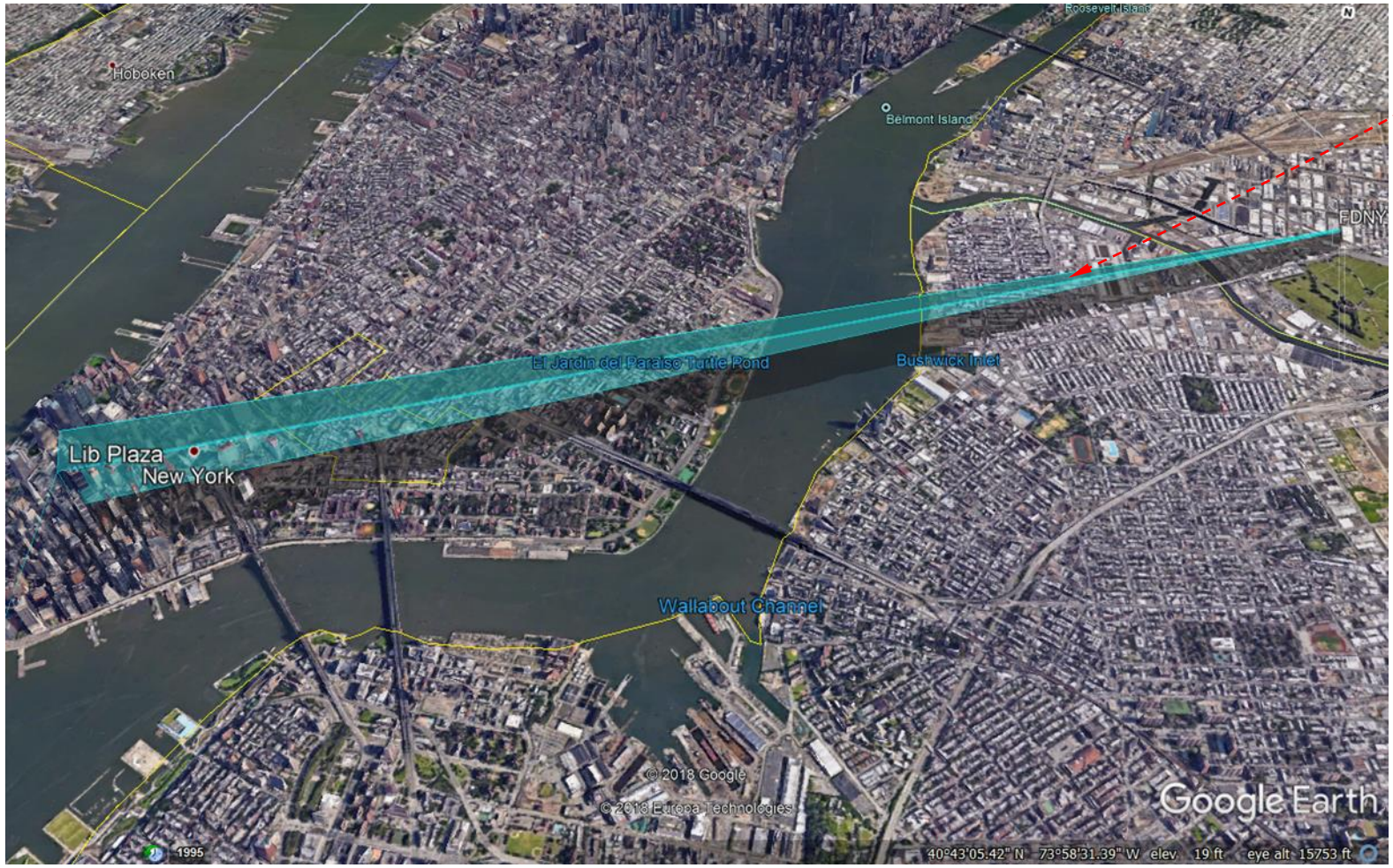
Many configurations are possible where RLAN transmitter is line-of-sight with microwave receiver with minimal building penetration loss.

One example follows…

Indoor RLAN Interference into Microwave: Example

Victim Receiver: FDNY LIC SHP (WQHC829) facing Liberty Plaza (WQHC635)

- Path Length = 7.45 km
- Blue shaded area shows antenna approximate 3 dB beamwidth

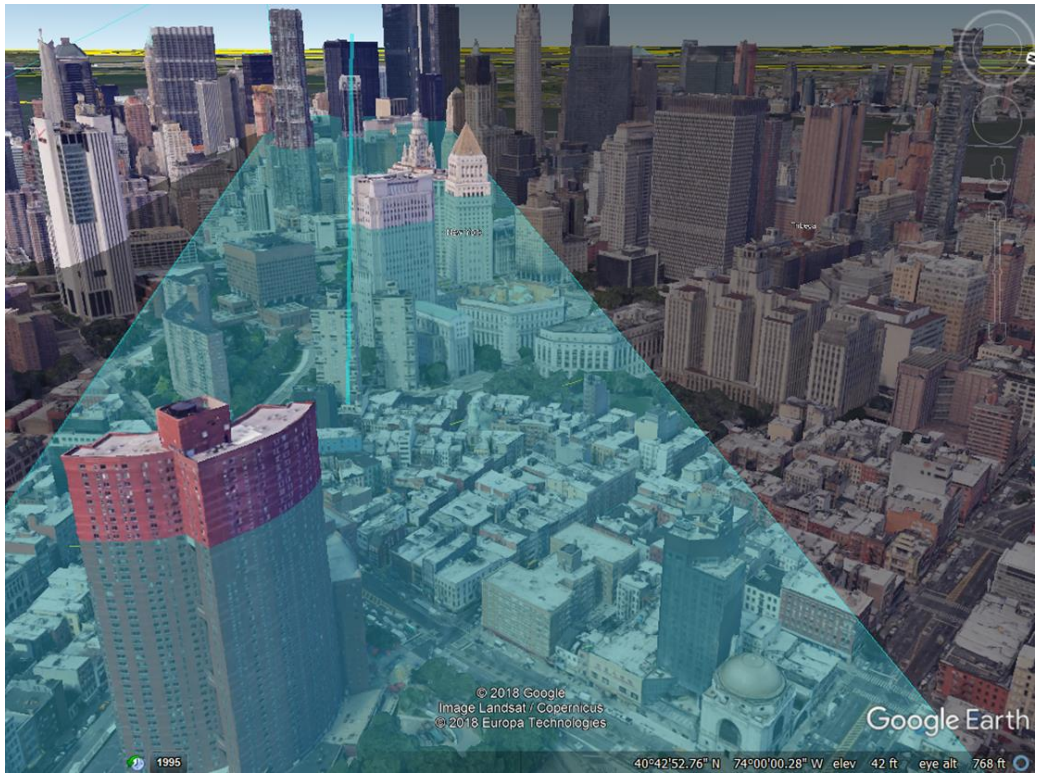


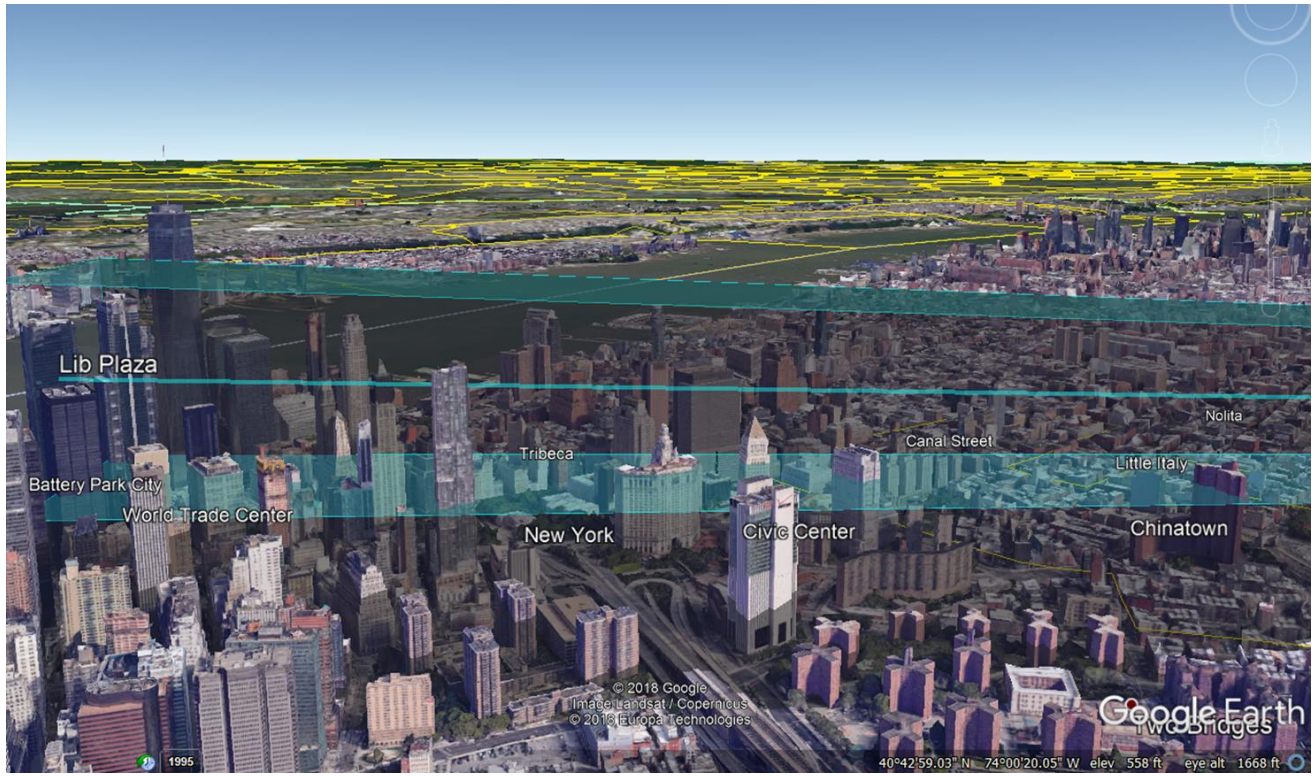
Indoor RLAN Assumptions:

- $EIRP_{RLAN}$ = 20 dBm
- Building loss = 20 dB
- I/N_{obj} = -6 dB
- $Bw_{corr(80/30)}$ = 4.26 dB
- $Gain_{MW\ Rx\ Ant}$ = 37.9 dBi

Indoor RLAN Interference into Microwave: Example

- **Indoor RLAN misses objective by 8.1 dB at distance of 7.45 km**
- Interference Potential out to 19 km
- Antenna Beamwidth is 2.0 degrees → 260 m across at 7.45 km
- Beam contains numerous potential indoor interferer locations





Interference Detection and Reporting

Microwave licensees must be protected without having to undertake proactive interference detection campaigns.

- Difficult and expensive for microwave licensees to identify and track down interference.
- Typically requires microwave systems to shut down in order to take measurements.

Exclusion zone modeling must not depend on model-tuning from microwave interference reporting.

Assuming interference can be detected:

- Reporting can be similar to CBRS
- Incumbent will contact database administrator and report interference
- Database administrators will collaborate to confirm and mitigate interference

Incumbent can still contact FCC as they do now

- FCC can work with database administrator(s) to identify and mitigate interference

Summary

Unlicensed RLAN sharing in 6 GHz band(s) with microwave systems via databases may be possible, but more study is needed.

Sharing must have no impact on full and free deployment of microwave.

All RLAN devices must use database approach.

Accurate data on microwave systems is critical to avoiding interference.

Microwave exclusion zones should be based on actual receiver configurations.

Microwave filing and coordination activity is sufficiently dynamic to require frequent (at least daily) interactions with coordination system.

Interference mitigation must not rely on proactive involvement from microwave licensees.

Multi-stakeholder groups such as the Wireless Innovation Forum should be considered for development of appropriate sharing methodology

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Thank You!